

REPORT ON INTERNATIONAL CONFERENCE ON INSTRUMENTATION FOR
HIGH ENERGY PHYSICS, DUBNA, USSR

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This note summarizes the main features of the Dubna Conference on instrumentation, which was held directly following the Kiev (Rochester) high energy physics conference. It will be the last instrumentation conference so closely coupled to the physics meeting; the powerful arguments for decoupling the two have finally prevailed, and henceforth the meetings will be independent.

The opening session, on computer-controlled data acquisition, revealed how well established and widespread this mode of operation is; the emphasis is now shifting to tailoring apparatus design to minimize computer analysis time. Sessions on magnetic spectrometers and missing-mass spectrometers showed many large scale systems in construction, but no major innovations.

A session on filmless detectors was largely devoted to the problems of proportional chambers, for which a standard technology has not yet been attained. Readout costs, over \$10/wire, are still so high as to inhibit very large systems; constructional difficulties still await satisfactory solutions; and a standard gas filling has not yet been achieved. Work on

liquid-filled chambers has turned from argon to xenon fillings; these now appear much more promising.

Several Russian and German groups have achieved some success in the measurement of ionization density in streamer chambers, but apparently this technique has yet to be used in an experiment; the German group, Eggert et.al., used image intensifiers of high resolution, showed beautiful pictures allowing ionization density determinations to 7-8%. Streamer chamber experiments to date are still using film recording in the classic bubble chamber manner.

In gamma-ray and electron shower detection, emphasis is shifting from high resolution in energy measurement to the design of detectors that locate the interaction point as well as measure energy; no completely satisfactory system has yet emerged. The session on Cerenkov detectors showed no striking new ideas; several beam energy monitors using Cerenkov detectors were described.

A session on transition radiation detectors, concerned entirely with Russian work, shows it to be at the point where detectors of the x-ray component of the spectrum are about to be tested, but no results are yet available.

A session on bubble chambers consisted mainly of progress reports on various large systems; none of these have yet achieved a steady operating state, and only preliminary performance data are available, if any. P. Hough reviewed data-handling systems for bubble chambers; unsurprisingly, he favors film data storage and very large computers for data analysis

at minimum cost. The Oxford group reported improvements in PEPR operation that allow event measuring rates of 150-430 events/hour.

A session on special particle beams brought descriptions of several charged and neutral hyperon beams (Sandweiss, Pondrom); photon beams, tagged or polarized, and a Serpukhov electron beam of 30 GeV. The "Miscellaneous" session included my paper on detection requirements at the 200-GeV accelerator, and a variety of odds and ends including a spark counter with a semiconducting glass electrode allowing spatial location to low accuracy. Varlamov et.al. reported an interesting hybrid spark-cloud chamber; a pulsed electric field following particle passage induces avalanche multiplication in the proportional region. Immediately afterwards, the chamber is expanded and cloud chamber tracks of the amplified ionization are obtained. By adjusting the parameters, only the amplified tracks are visible, so that the chamber has the excellent time resolution provided by the amplifying pulse; a clearing field keeps the chamber clean at other times. The major disadvantage is the recovery or dead time, which the authors hope to reduce markedly from the current value of 1 minute by introducing rapid recompression.

The final afternoon brought two sessions which I chaired, one on high energy neutrino detectors; papers were given by Kaftanov and by Nezhnick and Walker of NAL. A final session, a discussion of new trends in particle detection, provided a summary and conclusion to the conference.

As organized under Prof. V.P. Dzhelepov, chairman, the conference extended over five days, with sessions from 9:30 A.M. to (nominally) 6:30 P.M. with time out for coffee and dinner. This rather strenuous regime - on most days the meetings ended closer to 8:00 P.M. - had the great virtue that there were no parallel sessions; and the nature of the field is such that parallel sessions can rarely be devised that do not set up conflicts of interest. In addition, for the most part the organization of the subject matter presentation was excellent; the subjects were well chosen, and rapporteurs were generally conversant with the field they covered. The contributed papers were, perhaps, somewhat overweighted with Russian contributions, not all of great import; and too little attention was given to instrumentation problems of very high energies.

One all but unavoidable feature of the bilingual conference was the inadequacy of the simultaneous Russian to English translation. The interpreters were very good when a prepared text was followed; I have never seen a better performance. Unfortunately that is not enough; when the speaker did not follow a prepared text, the translations, which require a physicist's comprehension, frequently could not keep up with the speaker.